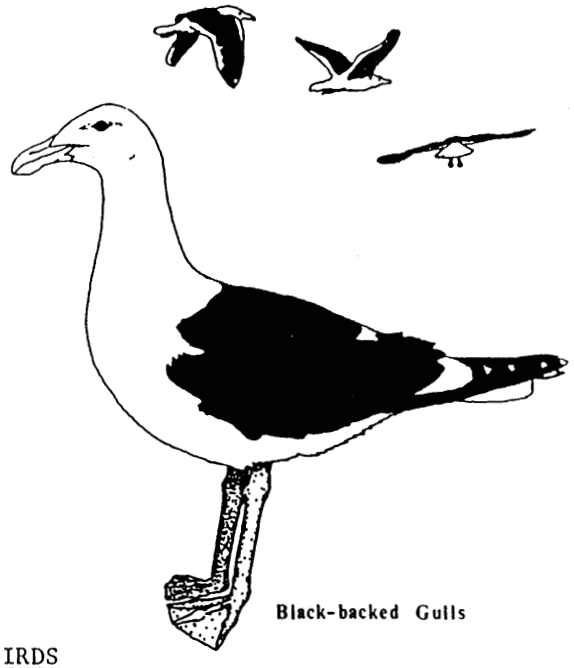
SCAVENGING

All of the animals on the sea shore or in the sea, eventually die or are killed, but we seldom find rotting bodies on the shore. There are a number of animals, known as scavengers, which are specialist feeders on the dead remains and they are all very quick to find and consume this food.

Their food is always dead or moribund, so the scavengers only need to locate and eat it. They do not require any special behaviour or equipment to catch and kill the food animal, as do predators. Dead and dying animals start to rot quickly in sea water and the smell of putrescent flesh stimulates the scavengers. They are able to rapidly establish just where the smell is coming from and move speedily towards it. The food animal often still retains the passive natural defences which were effective when the animal was alive, such as scales, external skeleton or shells. The scavengers have the means for penetrating or dislodging these, and also equipment for tearing apart the flesh within.

Many animal groups have representatives that are specialized scavengers or else predators that also scavenge. Some of the sea birds, fish, whelks, and polychaete worms and many of the crustacea are the most obvious examples.

They all have three features, highly developed for their feeding habit.
1. Sensing the presence of dead and dying food as soon as it becomes available, and locating its position, by smell and or sight.
2. Rapid movement to the food.
3. A tearing and chewing apparatus for rending the food into easily swallowed portions



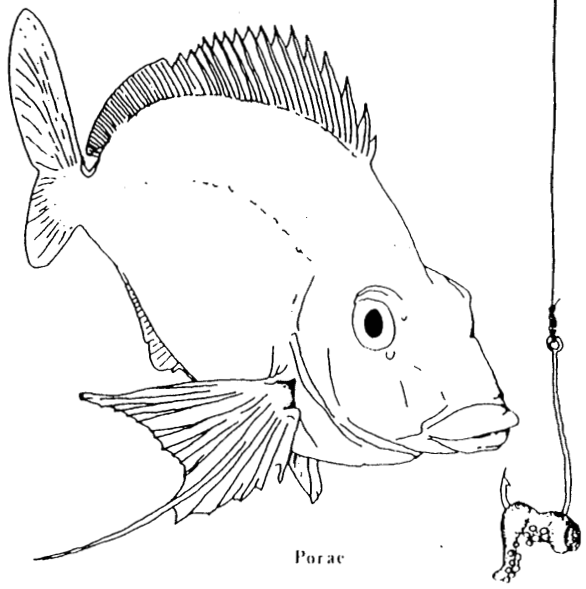
Black-backed Gulls

BIRDS

The gulls, especially the Southern black-backed gull and the red legged gull, are important scavengers both of the shore line and inland. The black-backed gull has increased in numbers considerably over recent years due to man's influence. Huge flocks are found around rubbish tips scavenging a good living from carrion and food scraps. On the shore this very large gull finds dead fish and shell fish with his keen eyesight and speedy movement in swimming, flying and running. Their strong, heavy bill is used to wrench, tear and shear the food apart and they break open shells by smashing them on the rock while held in the bill, or by dropping them on to the hard shore while flying. They are aggressive and will fight or chase off other gulls as they compete for their food.

FISH

Many fish are highly specialized in their feeding habits, generally feeding on living animals in specific situations, eg., on encrusting animals on rocks, or on other swimming animals in open water. However many are fairly unselective and will try whatever food is available, so long as they can manage it. Therefore any fish that will take a baited line can be considered a scavenger, even though it may be mainly predatory. There are also many others, too small, or with too small a mouth to be caught on a hook, that peck and nibble at any dead animal food that they can take. Using olfactory/smelling organs set into the front of their head, they can sense the presence of dead or injured fish in the water, and consume them whole, or bite clean through with their sharp teeth.

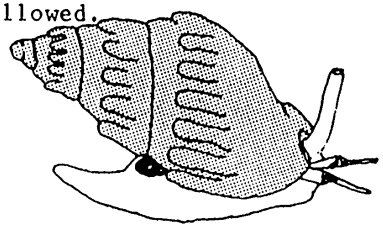


Porae

WHELKS

The five species of Cominella whelk are the most important scavenging molluscs of the shore and subtidal shallows.

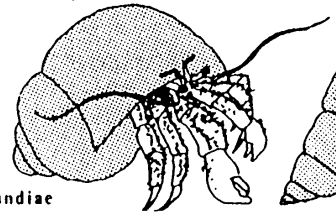
They have a very long, trunk-like siphon at the front of their pointed shell. It allows them to draw in their water current with precision and accurately locate the smells of decaying food. The rasping radula lies within a broad, highly extensible proboscis which probes down into shell apertures, between fish scales and bones, or into the exoskeletons of crustacea. The flesh inside is mascerated by the toothed radula and the resultant pulp sucked up through the proboscis tube and swallowed.



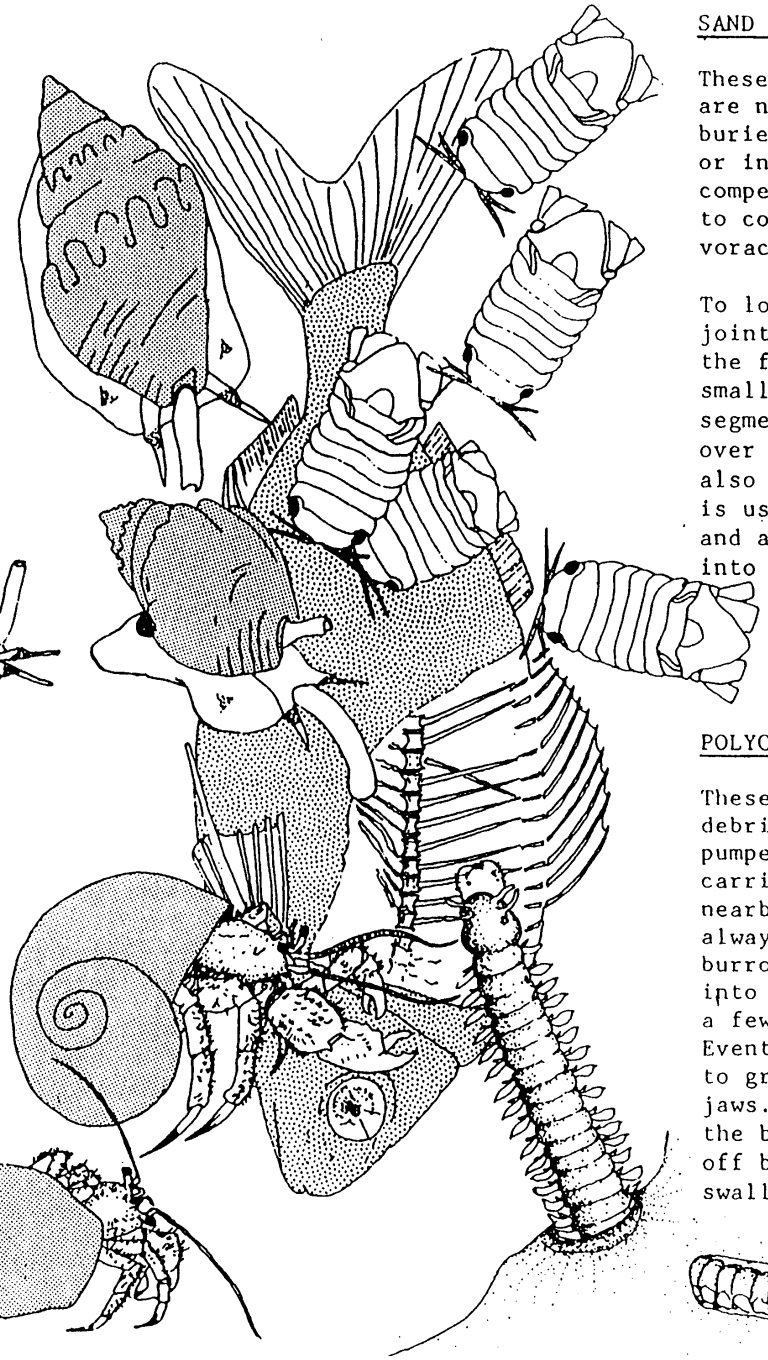
Cominella glandiformis

HERMIT CRABS

These squatters in empty gastropod shells, are common subtidally and in pools on the shore. Water drawn to the gills for respiration, passes over antennae at the front of the head. These flick back and forth like metronomes, testing the water for food smells. They are greedy scavengers but also snap up any small animals they can catch. On sensing carrion, they quickly scuttle to it and messily snip and tear at the flesh with their pincers. The small pincer passes portions to the mouth and the limbs there, further rend and stuff it in. Hermit crabs may come almost right out of their shells to get into awkward places of the food animal.



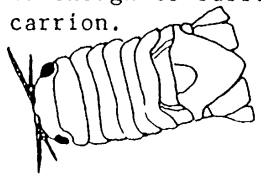
Pagurus novaezelandiae



SAND LICE

These small flattened crustacea (10-20mm) are numerous on the shore but generally buried in coarse sediments under boulders or in clean sand. In the drift line they compete with few other scavengers, emerging to congregate in large numbers and feeding voraciously on stranded animals.

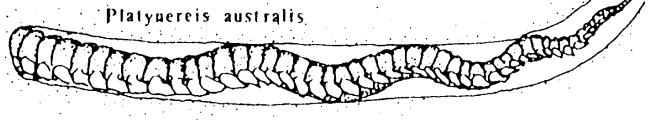
To locate their food, they have a pair of jointed antennae protruding laterally from the front of the head. They have rows of small legs, flattened like oars, under the segmented body, which propel them speedily over the bottom or through the water. They also have a broad and powerful tailfan that is used in swimming. They have strong jaws and are small enough to burrow right down into large carrion.



Isocladus armatus

POLYCHAETE WORMS Ragworms

These worms form burrows in sand, mud or in debris under boulders. The water which is pumped through the burrow for respiration, carries the smells of any decaying animals nearby. They approach the food cautiously, always keeping at least the tail tip in the burrow mouth, to facilitate a rapid retreat into their safe refuge. The food is probed a few times to test its state of mortality. Eventually, the worm everts its proboscis to grab it with a long pair of pincer-like jaws. If possible the food is dragged into the burrow mouth, where pieces are sloughed off by small rasping proboscis teeth, and swallowed.



Platynereis australis

by John Walsby

DEPOSIT FEEDERS

The stirring action of the sea's waves and currents keeps fine particles suspended in the water. However, in protected harbours, and off-shore in the deep, water movement is very reduced and the suspended particles settle out to make soft muddy substrates. The deposits consist of fragments of dead plants and animals, dead plankton, faeces of living animals and particles washed down off the land, rich in minerals and decaying organic matter. This rich mud is an ideal growth medium for bacteria and many minute plants and animals. Deposit feeders live in these soft substrates, feeding on the fall-out material and the micro-organisms that flourish on it.

Protected shores like Whangateau Harbour and the top of Leigh Cove (both close to the Marine Reserve) have extensive shallow mud flats. The sea water can be heated up considerably as it passes over the sun-warmed shore in such harbours and these warm conditions promote rapid growth of the micro-organisms. At low tide, in shallow damp or wet depressions, green-brown scums can be seen developing very quickly on sunny days.

Specialist deposit feeders come from many of the animal groups. Various methods are used to skim off the nutritious surface sediments. They digest any organic matter that is taken in, with, or adhered to the soft substrate particles. As most of what they ingest is mud or silt, they have to take in enormous amounts of material to meet their nutritional needs. The deposit feeders do not require special equipment to catch, secure or render their food, the mud is simp')ucked, shovelled or scooped into the mouth. Some move slowly on the surface to feed; others just collect what settles out or grows around them.

On these flat shores there is very little protection from desiccation or predators, so most lie buried or if they come out on the surface, they have sharp eyes and fast movement for escape back to the safety of their burrow. All are dull coloured so as to be inconspicuous when on the surface.

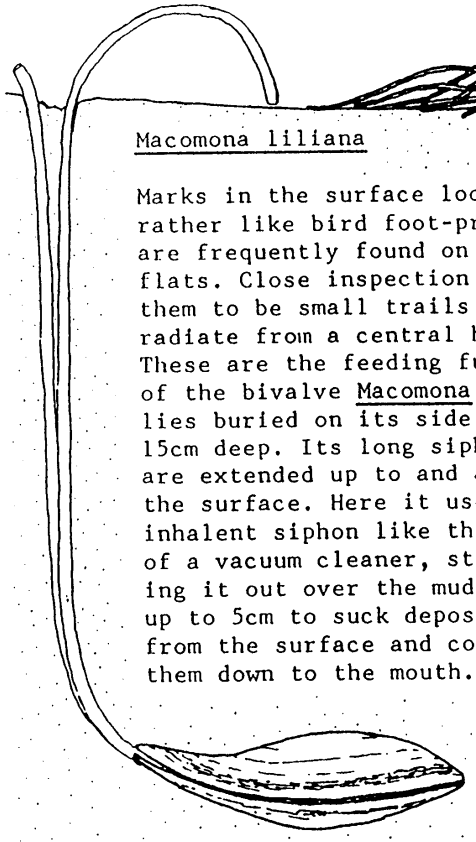
Polychaete Worms

These are amongst the most important of the deposit feeders, but buried permanently in the mud, they are easily ignored. There are two groups; the deposit swallowers and the deposit selectors.

Deposit swallowers, like the mud snails, engulf large amounts of substrate. They are often conspicuous by the piles of faeces or worm casts that they leave on the surface by the posterior burrow opening. Some keep the anterior opening wide and funnel shaped so that the fine, rich deposits moved by the tide are washed into the collection pit Such worms have a large eversible proboscis for engulfing the collected deposits.

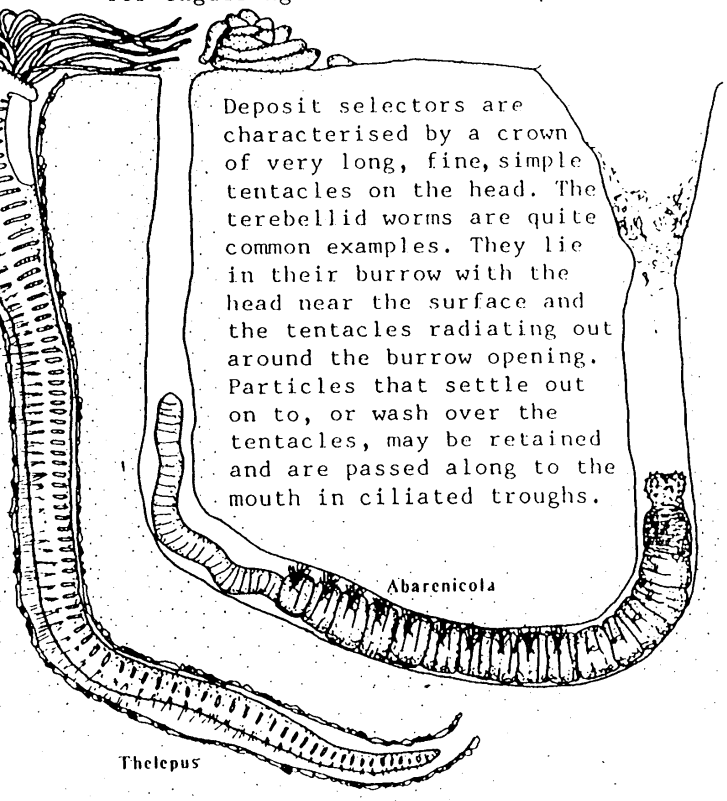
Macomona liliana

Marks in the surface looking rather like bird foot-prints are frequently found on mud-flats. Close inspection shows them to be small trails that radiate from a central hole. These are the feeding furrows of the bivalve Macomona which lies buried on its side some 15cm deep. Its long siphons are extended up to and above the surface. Here it uses the inhalent siphon like the hose of a vacuum cleaner, stretching it out over the mud for up to 5cm to suck deposits from the surface and conduct them down to the mouth.



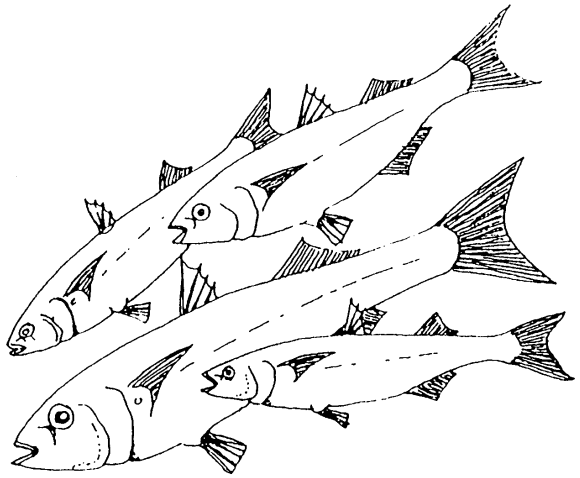
Macomona

Deposit selectors are characterised by a crown of very long, fine, simple tentacles on the head. The terebellid worms are quite common examples. They lie in their burrow with the head near the surface and the tentacles radiating out around the burrow opening. Particles that settle out on to, or wash over the tentacles, may be retained and are passed along to the mouth in ciliated troughs.



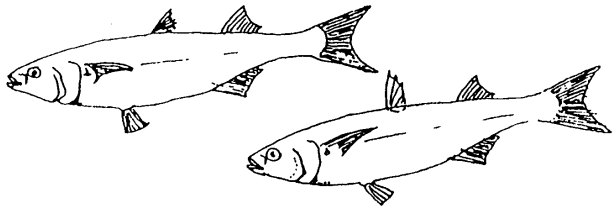
Abarenicola

Thelepus



Fish

For Aldrichetta fosteri, the yelloweyed mullet, the harbour shallows over the mud-flats and amongst mangroves, are a rich feeding ground. They can tolerate warm, muddy water and penetrate up creeks and into the quiet shallows as large schools. Here they are safe from many of the larger open-water predatory fish. They snap up small animals and graze fine weed but also consume large amounts of the rich organic bottom detritus that accumulates in the most sheltered places. An average sized mullet (20cm long) will eat more than a kilogram of deposits a day.

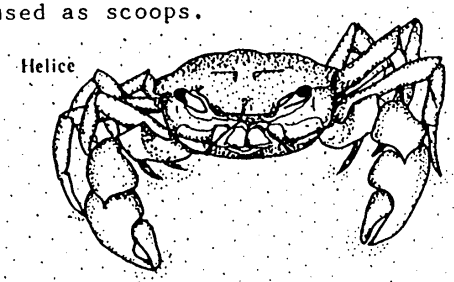


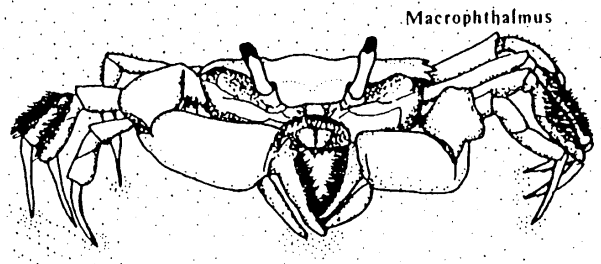
Mud Crabs

Two species, Helice crassa & Macrophthalmus hirtipes, are common and important deposit feeders. Helice occurs where the substrate is more consolidated and its burrow is more permanent. Macrophthalmus is typical of the areas where the mud is slushy. Both make short excursions on to the mud but seldom stray far from the safety of the burrow. The pincer legs (chelae) are used by both crabs, first to probe and test the surface deposits and then to take up small selected portions and pass them to the mouth.

Helice has a small concavity in the fixed finger of the pincer and it uses this spoon to scoop up its carefully chosen portions.

Macrophthalmus has a brush of hairs on the movable finger of the pincer, to which mud and food particles adhere when the pincers are agitated in the wet surface slush. The pincers are also slightly dished and are sometimes used as scoops.





Mud Snails

Amphibola crenata & Zeacumantus lutulentus are two species which are characteristic of mud flats and are very numerous in the most sheltered parts of protected harbours. Here they feed on the rich surface sediments.

Amphibola is a large pulmonate snail with a round, roughly sculptured shell, dull brown in colour. They move over the surface of the upper fine-grained mud-flat skimming off large amounts of organic mud. They feed continuously and indescriminately over the low tide period, leaving behind them an unbroken faecal trail, like a thick thread. Their gut is simple and food passes right through in about 15 minutes. Probably the micro-organisms taken in with the sand are titurated in the crop, just enough to break the cell walls and release the cell fluids which are then absorbed by the snail.

Zeacumantus, the spire shell, is found with Amphibola but its range extends into more slushy mud lower down the shore. The shell is a narrow, tapering spire, up to 3cm long, dark grey to mud coloured, and generally filmed with mud. Towards the spire the shiny periostracum is worn away, by the shell being trailed through the mud as the snail ploughs a trough through the surface, leaving a broad track behind. They may be found in densities of over 200 per square metre, indicating how rich these muddy "bare" areas are.